

REMARKS

Reconsideration of the above identified application in view of the preceding amendments and following remarks is respectfully requested.

Claims 18-23, 25-28 and 30-35 are pending in this application. By this Amendment, Applicants have amended Claims 18, 19, 21, 25 and 34. The claim amendments were made to more precisely define the invention in accordance with 35 U.S.C. 112, paragraph 2. These amendments have not been necessitated by the need to distinguish the present invention from any prior art. It is respectfully submitted that no new matter has been introduced by these amendments, as support therefor is found throughout the originally filed application.

In the Office Action, Claim 35 was objected to. It is now believed that Claim 35 has the correct identifier and withdrawal of the objection is respectfully requested.

In the Office Action, Claims 21-23, 25 and 32-34 were rejected under 35 U.S.C. § 103 (a) over U.S. Patent No. 5,847,394 to Alfano et al. (Alfano '394 patent) in view of U.S. Patent No. 5,983,120 to Groner et al. (Groner et al.).

The Alfano '394 patent creates a single image of an object at a depth below the surface thereof based upon the polarization or depolarization of light (see col. 4, line 35). A single wavelength of polarized light illuminates the surface of a turbid medium. The '394 suggests illuminating the surface with light of two different wavelengths (λ_1, λ_2) and forming an image (i) at a deep layer using the reflected normal components (e.g., the cross-polarized or perpendicular components ($\lambda_{1L}, \lambda_{2L}$)) of the partially depolarized wavelengths. As described in col. 4, lines 54-61, the perpendicular light from one

wavelength is subtracted from the perpendicular light of another wavelength to form the image, e.g., $i = (\lambda_{1\perp} - \lambda_{2\perp})$. Alfano et al. use only cross-polarization without contrast agents.

Groner et al. disclose a method of reflected spectral imaging analysis of blood to determine such things as hemoglobin concentration or the number of white blood cells. Groner et al. disclose a simple bi-chromatic correction function that normalizes raw reflected images with respect to the background. By capturing reflected images at two wavelengths, only one of which is absorbed by hemoglobin, the background effects are subtracted away by subtracting the non-absorbed wavelength (see col. 9, line 58 to col. 10, line 9). Similar to Alfano et al., Groner et al. use only cross-polarization without contrast agents.

It is respectfully submitted that one skilled in the art to which the subject invention appertains would not have been motivated to combine the Alfano '394 patent with the Groner et al. patent as suggested by the Examiner. One of ordinary skill in the art would not look to combine the optical imaging system for objects of Alfano '394 with the spectral analysis of blood invention of Groner et al. because one looking to improve upon imaging objects such as in Alfano '394 would not look to the far removed field of spectral analysis of blood in Groner et al.

As the Examiner must know, it is the Examiner's duty to make a proper prima facie case of obviousness before rejecting a claim. "[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." (*In re Kahn*, 441 F. 3d 977, 988 (CA Fed. 2006) cited with approval in KSR). The Examiner should be aware, of course, of the distortion caused by hindsight

bias and must be cautious of argument reliant upon ex post reasoning. *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 USPQ2d at 1397.

Neither Alfano '394 nor Groner et al. provide a motivation, teaching or suggestion to combine these references in the manner suggested by the Examiner with the Groner et al. normalization correction being applied at the end of the Alfano '394 process. The Examiner notes that the combination is obvious because the correction function of Groner et al. would improve the visibility of object features.

This rationale is insufficient because Groner et al. does not teach using the bi-chromatic normalization correction to improve object detection in deep tissue such as Alfano '394 is directed to. Rather, Groner et al. suggest use of the bi-chromatic normalization correction on raw reflected images to improve spectral analysis, which is a completely different technique with a different application.

It is only through impermissible hindsight reconstruction based on the Applicants' disclosure that one could envision this combination. The Examiner has simply cobbled together various parts using the claims as a blueprint in an effort to meet the claim limitations. Hence, the Examiner's rationale is insufficient and, in turn, the combination is not proper. Accordingly, applicant's representative asserts that Claims 21-23, 25 and 32-34 are patentable over the combination of the Alfano '394 patent and Groner et al.

Furthermore, for the sake of argument, even if the references were combined as suggested by the Examiner, the claimed invention would not be obtained. If the two disclosures were combined, the process of Alfano '394 would simply obtain the perpendicular light from one wavelength being subtracted from the perpendicular light of

another wavelength ($\lambda_{1\perp} - \lambda_{2\perp}$). As can be seen, Alfano '394 already took raw data from two wavelengths and performed such a subtraction of the cross-polarized reflected light, which is the correction function of Groner et al.

It is worth noting that this addition of features from Groner et al. is simply addition of a feature already performed by the process of Alfano '394. This circumstance is a further reason why the combination is improper. In other words, one would not be motivated to make a combination of the correction function of Groner et al. to Alfano '394 when the correction function would be duplicative, e.g., not provide further enhancement of the resulting image but rather simply perform the same step again.

In contrast, Claim 21 recites, *inter alia*, an apparatus for imaging a tissue region including a linear optical system with an analyzer operable to: i) form a first difference image for a first wavelength of the light by subtracting the respective detected light having the second polarization direction from the detected light having the first polarization direction; ii) form a second difference image for a second wavelength of the light by subtracting the respective detected light having the second polarization direction from the detected light having the first polarization direction; iii) create a third image of a layer in the tissue region by subtracting the second difference image from the first difference image; and (iv) map a cancer tumor border in the tissue based on the third image.

Consequently, the difference images of limitations (c)(i) and (c)(ii) are for single wavelengths, then these single wavelength difference images are subtracted to create the third image of limitation (c)(iii). For example, graphical representations for

these three steps may be $i_1 = (\lambda_{1\perp} - \lambda_{1\parallel})$; $i_2 = (\lambda_{2\perp} - \lambda_{2\parallel})$; and $i_3 = (i_1 - i_2)$.

Neither reference, alone or in combination, teaches or suggests forming difference images from differently polarized reflections, e.g., co-polarized and cross-polarized reflections, then creating a third image from those images. Accordingly, Claim 21 and each of the claims depending therefrom are patentable over the combination of Alfano '394 and Groner et al. and an action acknowledging the same is respectfully requested.

Regarding Claim 32-34, they recite apparatus and a method having similar limitations to that of Claim 21. Hence, Claims 32-34 are also patentable over the combination of Alfano '394 and Groner et al. for at least the same reasons and an action acknowledging the same is respectfully requested.

In the Office Action, Claims 20 and 26 were rejected under 35 U.S.C. § 103 (a) over Alfano '394 and Groner et al. in view of Kaufman et al., Claims 19, 27 and 30 were rejected under 35 U.S.C. § 103 (a) over Alfano '394 and Groner et al. in view of either Eckhouse et al. or Khalil et al., Claim 31 was rejected under 35 U.S.C. § 103 (a) over Alfano '394 and Groner et al. in view of either Eckhouse et al. or Khalil et al. and Kaufman et al., Claims 18 and 28 were rejected under 35 U.S.C. § 103 (a) over Alfano '394 and Groner et al., and Claim 35 was rejected under 35 U.S.C. § 103 (a) over Alfano '394 and Groner et al. in view of Richards-Kortum et al.

Neither Eckhouse et al., Khalil et al., Richards-Kortum et al. nor Kaufman et al. cure the deficiencies of the combination noted above. Hence, Claims 18-20, 26, 27, 28, 30, 31 and 35 are patentable because the combination is improper for at least the reasons noted

above with respect to Claim 21, and an action acknowledging the same is respectfully requested.

More particularly, Eckhouse et al. describe a method for treating psoriasis using pulsed light, spot sizes, and different wavelengths. Different wavelengths are used to achieve different penetration depths. Polarization, pulsed light, excitation and emission are all different phenomena. One would not normally mix and match among these technology because the laws of one type can never be automatically extend to other types, e.g., polarization. For this additional reason, the combination with Eckhouse et al. is not proper. Hence, Claims 18-20, 26, 27, 28, 30, 31 and 35 are patentable because the combination is improper, and an action acknowledging the same is respectfully requested.

Turning to Khalil et al., Khalil et al. describes an optical sensor with selectable sampling distance for determining the analytes concentration using diffuse reflectance. Determining analyte concentration is not related to the subject invention as claimed. One would not look to such far afield technology and make combinations. Further, polarized light and diffusely reflected light behave differently. One would not mix and match these technologies because the laws of one type can never be automatically extend to other type, e.g., polarization. For these additional reasons, the combination with Khalil et al. is not proper. Hence, Claims 18-20, 26, 27, 28, 30, 31 and 35 are patentable because the combination is improper, and an action acknowledging the same is respectfully requested.

Turning to Richards-Kortum et al., Richards-Kortum et al. describe methods for enhancing nuclear structure and morphology during imaging. Richards-Kortum et al. focuses on the application of the contrast agents to this technique. Otherwise, Richards-

Kortum et al. has no relevance to the suggested invention as claimed. One would simply not look to such an irrelevant reference and make the proposed combination because the necessary rationale is missing. Further, Richards-Kortum et al. do not disclose technology that can be extended to use with reflectance or fluorescence polarization and, as a result, the combination is not obvious. For these additional reasons, the combination with Khalil et al. is not proper. Hence, Claims 18-20, 26, 27, 28, 30, 31 and 35 are patentable because the combination is improper, and an action acknowledging the same is respectfully requested.

Turning to Kaufman et al., Kaufman et al describe a general idea of 3D visualization and exploring an image, which are not related to the subject claims. One would not simply reach out to Kaufman et al. and pluck an isolated feature because it is so irrelevant to the claimed invention. For this additional reason, the combination with Kaufman et al. is not proper. Hence, Claims 18-20, 26, 27, 28, 30, 31 and 35 are patentable because the combination is improper, and an action acknowledging the same is respectfully requested.

Further, Claims 18-20, 26, 27, 28, 30, 31 and 35 contains similar limitations to that of Claim 21, so even if the additional combinations were proper for the sake of argument, the subject claims would not be obtained. Thus, for at least this additional reason, Claims 18-20, 26, 27, 28, 30, 31 and 35 are patentable, and an action acknowledging the same is respectfully requested.

Applicants submit that the pending claims are in condition for allowance, and a notice of allowance is requested in due course. A petition and related fee for a two-month extension of time is included with this Amendment. If the amount of the extension

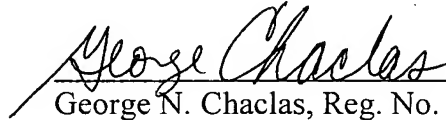
Serial No. 10/803,329
Art Unit 3737

is deemed inadequate for any reason, please consider this a conditional petition for the proper extension. If the fee amount is deemed inadequate for any reason, please consider this conditional authorization to charge any needed fee to our Deposit Account No. 04-1105.

If a telephone interview would assist the Examiner in any way, please contact applicants' undersigned attorney.

Respectfully submitted,

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